

THE GENUS PILINIA.

F. S. COLLINS.

Plate 77.

In a previous paper¹ the writer noted the occurrence of *Pilinia rimosa* Kütz. in Maine, and made some comparison of the species with the plant known as *Acroblaste Reinschii* Wille. There is nothing to add in regard to the former species, but observations made on forms of *Acroblaste* from various stations indicate that all can best be included under *Pilinia*, with somewhat changed definition, as follows:—

Basal layer of abundantly branched filaments, from which arise erect filaments, simple or branched, sometimes terminating in articulate hairs; chromatophore covering the cell wall; sporangia roundish, ovoid or clavate, terminal or lateral on erect filaments, or sessile on the basal layer, the contents forming numerous biciliate zoospores, which escape through an opening at the summit, development unknown.

With this extension the genus will include six American species, all marine, *P. rimosa* and *P. maritima* occurring also in Europe, the others known only in America; *P. maritima* connecting it with *Chaetophora* and originally placed in that genus by Kjellman; *P. Lunatae* and *P. minor* at the other end coming close to *Gongrosira*. The following key may be found convenient in distinguishing the species.

KEY TO THE AMERICAN SPECIES OF PILINIA.

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| 1. Filaments often ending in hairs. | <i>P. maritima.</i> |
| 1. Hairs not present. | 2. |
| 2. Erect filaments short, densely packed. | 3. |
| 2. Erect filaments longer, yellowish. | 4. |
| 3. Dark green; filaments 8–12 μ diam.; on live shells. | <i>P. Lunatae.</i> |
| 3. Yellowish green; filaments only 2–5 μ diam.; on pebbles. | <i>P. minor.</i> |
| 4. Forming a rather firm, spongy coating on woodwork. | <i>P. rimosa.</i> |
| 4. Forming a thin, soft coating. | 5. |
| 5. On shells, pebbles, etc.; sporangia on erect filaments. | <i>P. Reinschii.</i> |
| 5. On woodwork; sporangia on basal layer, rarely lateral on erect filaments. | <i>P. Morsei.</i> |

¹ Collins, Notes on New England Algae, RHODORA, Vol. V, p. 207, 1903.

The genus *Acroblaste* was founded on material from Buzzards' Bay,¹ but no specific name was given; it was left in the unsatisfactory form *Acroblaste* spec., but with sufficient description and good figures. Wille² gave it the name *Acroblaste Reinschii*. There appears to have been no farther report of its occurrence in southern New England, but when a somewhat similar form was found at Revere Beach, Massachusetts, it was identified by the writer with Reinsch's plant, and was distributed under Wille's name as P.B.-A., No. 162. This plant, which was found only on the shells of *Lunatia heros* Adams, differed somewhat from Reinsch's description, but in the absence of any specimens, it was impossible to determine how much variation should be allowed for. Within the last two years the writer has found a plant at Mattapoissett, Wood's Hole and Eastham, all in southern Massachusetts, all agreeing with each other and with Reinsch's description and figures, without any tendency in the direction of the differences shown by the Revere Beach plant. The latter has, moreover, been collected at all seasons of the year, and in no instance did it come any nearer to the southern form. Under these circumstances it seems best to consider it distinct, and to characterize it as follows:—

P. Lunatiae n. sp. *Acroblaste Reinschii* Collins, List, RHODORA, Vol. II, p. 43, 1900, as to northern Massachusetts localities only; Collins, Holden & Setchell, P. B.-A., No. 162, 1896. Filamentis basalaribus mox in stratum subparenchymaticum concretis, cellulis forma ac magnitudine variantibus, rotundatis vel angularibus, ad 15 μ diam.; filamentis erectis 8–12 μ diam., superne incrassatis, plerumque 5–6-cellularibus, rarissime usque ad 10-cellularibus, dense stipatis, ramificatione densa; cellulis ejusdem filamenti variantibus quoad formam et magnitudinem; sporagio e cellula terminali formato, a cellulis ceteris parum diverso; colore viridi intenso.

Basal filaments soon becoming united into a subparenchymatous layer, cells of varying shape and size, roundish or angular, up to 15 μ diam.; erect filaments 8–12 μ diam., increasing in size upward, usually 5–6 cells in length, quite rarely up to 10 cells, densely branched and very compact, cells varying in size and shape in the same filament; terminal cell becoming the sporangium, differing but little from any other cell of the filament; color deep green. On live shells of *Lunatia heros* Adams, Revere Beach, Massachusetts.

¹ Reinsch, Bot. Zeit., Vol. XXXVII, p. 361, Pl. III. A, 1878.

² Engler & Prantl, Nat. Pflanzenfam., Algen, p. 97, 1890.

This plant is common on the *Lunatia* shells at Revere Beach, so much so that in spring and early summer it is the exception to find a live shell free from it, and at all times it is to be found plentifully. It appears to die with the host, for it has never been found on dead shells. Its distribution seems to be very limited, as there is no record of its occurrence except at this one station, though the *Lunatia* is found all along the coast, and the alga has been sought for carefully on the Maine coast and in southern New England. It always occurs on the spire of the shell, which in the genus is quite flat; here it forms a roundish patch, thickest at the centre, the tip of the spire, and has never been known to cover more than a quarter of the surface of the shell. The color is a deep rich green, an unusual color in this genus, where a yellowish color is general. The substance is dense, and it is only by crushing or dissection that the structure can be made out. The basal layer is largely continuous, the filaments showing distinctly only at the edges; the erect filaments are short, stout, and of cells usually quite irregular in shape; they increase in size upward, but rather irregularly, the terminal cell being the largest, with a broad rounded top, but not differing otherwise from any other cell of the filament; the spores escape through an opening in the summit, as in other species. The general appearance is rather that of *Gongrosira* than of *Pilinia*.

P. MINOR Hansgirg in Foslie, Contribution to Knowledge of the Marine Algae of Norway, Tromsø Museums Aarshefter, XIII, p. 146, Pl. II, figs. 17-22, 1890. Stratum thin-coriaceous or almost crustaceous, yellow green, more or less extended. Filaments generally short and little branched. Vegetative cells 3-5 μ wide, 1-2 times as long, end cells rounded; in each cell a parietal band-shaped chromatophore. Prof. N. Wille of Christiana has kindly determined the American plant as belonging to the species of Hansgirg, of whose original description the foregoing is a translation. Our plant, however, seems to be more fully developed, so that a more complete account is now possible. There is little distinction between horizontal and erect filaments; near the substratum there is a densely packed cellular mass, in which it is difficult or impossible to distinguish filamentous structure; above this short filaments are easily made out, but they are not uniformly vertical, and they are quite irregular in size and shape of the cells. The latter may be cylindrical, as little as 2 μ diam., but are usually larger and not much longer than broad, ovoid or even subspherical;

the cells in a filament increase in diameter from the base to the summit, and may reach 6 or 7 μ diam. When the terminal cell changes to a sporangium, the size is still greater; the normal form of a sporangium seems to be pyriform, and the size 20–24 \times 10–12 μ , but various irregular forms are common. The distinction between basal and erect filaments is less than in *P. Lunatiae*, but the sporangia are more clearly differentiated. It was found on pebbles on the shore of the "Salt Pond," Eastham, Massachusetts, July, 1907. The pebbles were between high and low tide marks, and when the tide was out were wet with cold fresh water from a spring.

P. Reinschii (Wille) nov. comb. *Acroblaste* spec. Reinsch, Bot. Zeit., Vol. XXXVII, p. 361, Pl. III. A, 1878; *A. Reinschii* Wille in Engler & Prantl, Nat. Pflanzenfam., Algen, p. 97, 1890; Collins, List, RHODORA, Vol. II, p. 43, 1900, as to southern Massachusetts localities only; not Collins, Holden & Setchell, P. B.-A., No. 162, 1896. In this species the basal layer shows the filamentous character throughout, even when the filaments are laterally united; often they remain practically free. The erect filaments are 5–8 μ . diam., and may reach a length of 400 or 500 μ ; they are regularly cylindrical except for a slight constriction at the nodes, or less commonly increase in size very slightly upwards; in either case the terminal sporangium is sharply differentiated from the other cells, ovoid or oblong, 16–18 μ diam. Sometimes the erect filaments are simple, and it is only in such cases that the upper cells are larger than the lower; the difference is slight, in any case. Ordinarily the filaments are more or less freely branched, and of the same size throughout. The sporangia are terminal on the main filament or on longer or shorter branches; in some cases a branch is developed from the cell below a sporangium, pushing the latter to one side, so that it appears to be a lateral growth. The spores escape through a terminal opening in the sporangium, almost as large as its diameter; after their escape the filament may resume its growth, coming up through the persistent empty sporangium. It is not uncommon to find several empty shells at different heights on a long filament. The color is a yellowish, somewhat olivaceous green; Reinsch notes its resemblance to small species of *Ectocarpus*. He found it growing on shells of a species of *Turritella*, which it covers with a dense coating; and also on pebbles, both between tides and in shallow water. The writer has found it on other shells, and also on the claws of the spider crab, *Libinia canali-*

culata Say. It is often mixed with *Microchaete grisea* Thuret, *Calothrix* species, and other small algae.

P. RIMOSA Kützing, Phyc. Gen., p. 273, 1843; Collins, RHODORA, Vol. V. p. 207, 1903; Collins, Holden & Setchell, P. B.-A., No. 971, 1902. There is nothing to add to what was given in the writer's note on the first occurrence in America; no other locality has been reported.

P. Morsei n. sp. Filamentis basilaribus irregulariter contortis, plus minusve concretis, cellulis rotundatis, 8-15 μ diam., saepe longitudinaliter divisis, membranam subparenchymaticam bi-polystromaticam formantibus; filamentis erectis ad 2 mm. altis, 7-11 μ diam.; cellulis 1-2 diam. longis, cylindricis vel leviter moniliformibus; sporangiis ovoideis vel pyriformibus, stratum basale insidentibus, sessilibus vel ad pedicellum paucicellulare.

Basal filaments irregularly contorted, more or less united; cells rounded, 8-15 μ diam., often divided longitudinally and forming a subparenchymatous membrane of two or more layers; erect filaments up to 2 mm. high, 7-11 μ diam., cells 1-2 diam. long, cylindrical or slightly moniform; sporangia ovoid or pyriform, on the basal layer, sessile or on a few-celled pedicel. On woodwork, Atlantic City, New Jersey, Prof. S. R. Morse.

In this species there seems to be a differentiation between the fertile and the assimilative growths from the basal layer; the former are short, in many cases nothing but the sporangium itself; the latter are longer than in any other species of the genus. After a sporangium is emptied another may be produced by the same filament, but while in *P. Reinschii* the sporangia are at considerable intervals on a long filament, in *P. Morsei* they are "nested," usually only a single cell being produced to support the new sporangium. The cells of the basal filaments divide longitudinally, by a plane approximately parallel to the substratum. The color is yellowish. The writer takes pleasure in giving to this species the name of Prof. Silas Rutilus Morse of the New Jersey State Museum, who first called his attention to it, and to whom we are indebted for much of our knowledge of the algae of the New Jersey coast.

P. MARITIMA (Kjellm.) Rosenvinge, Grønlands Havalger, p. 933, fig. 43, 1893; *Chaetophora maritima* Kjellman, Spetsbergens Alger p. 51, Pl. IV, figs. 15-16, 1877. Frond subspherical, 1-3 mm. diam., with basal layer not strongly developed; erect filaments 6-10 μ diam.,

cells about as long as broad, terminating in articulate hairs or ovoid-elliptic cells; sporangia terminal, clavate, $11-12 \times 16-21 \mu$; color green. Greenland.

This species indicates the connection between *Pilinia* and *Chaetophora*; instead of an extended layer it forms roundish gelatinous thalli, forming, with *Calothrix* species, etc., a continuous stratum near high water mark. In 1884 the writer reported¹ its occurrence at Kennebunkport, Maine, but it has not since been seen, and subsequent examination of the material in question failed to show it, so that the report is now unconfirmed by any specimen. There is no reason, however, why it should not be found on the Maine coast, in company with other arctic forms.

MALDEN, MASSACHUSETTS.

EXPLANATION OF PLATE 77.

- Fig. 1. *Pilinia Lunatiae*, portion of basal layer.
 Fig. 2. " " two erect filaments with branches.
 Fig. 3. " " filament with emptied sporangium.
 Fig. 4. *P. Morsei*, section of basal layer with cells longitudinally divided, and two erect filaments.
 Fig. 5. *P. Morsei*, basal layer more developed, with long and short filaments and new and old sporangia.
 Fig. 6. *P. Morsei*, successive sporangia on short filament.

ACHILLEA TOMENTOSA AT WESTFORD, MASSACHUSETTS.— Between 1884 and 1888 I found at Westford, a striking yellow-flowered species of yarrow, since identified as *Achillea tomentosa* L., a native of southern and central Europe. It was in a field with other plants, introduced through the generous use of wool waste as a fertilizer. Some of the *Achillea* was transplanted to a private garden, where it still persists after twenty years, though in the field where it originally grew it has disappeared. As now applied the wool waste is kept until it decomposes sufficiently to kill the weed seeds it so often contains — a procedure more favorable to good agriculture than productive of botanical rarities.— EMILY F. FLETCHER, Westford, Massachusetts.

¹ Bull. Torrey Bot. Club, Vol. XI, p. 130.